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Radio Frequency Identification (RFID) Tracking of Hazardous Wastes Across International Borders

Impact Statement

The emergence of radio frequency identification (RFID) technology has important implications for tracking the movement of hazardous wastes and other materials. RFID is a potential tool for tracking the international transport of hazardous waste into the United States for disposal. This verification study will work to combine RFID technology with hazardous waste electronic manifest capability.

Background

The Resource Conservation and Recovery Act (RCRA) is EPA's regulatory and statutory authority for hazardous waste management, which imposes cradle-to-grave requirements for the management of hazardous wastes, including import and export. This project is in support of EPA's bilateral and trilateral trade agreements relating to the international shipment of hazardous wastes, including the Border 2012 Agreement between the U.S. and Mexico, along with the Smart Border Accord with Canada, and the trilateral environmental agreement under NAFTA, the North American agreement on environmental cooperation. Partnership in this program is multifaceted with several EPA offices, the National Aeronautics and Space Administration, and other federal, state, local, and tribal agencies.

RFID is an automated data capture technology that can be used to electronically identify, track, and store information contained on a tag or transponder. This tag consists of a chip and antenna. The chip is encoded with a unique identifier; thus, a tagged item can be uniquely read or identified. RFID provides identification and tracking capabilities by using wireless communication to transmit data in real-time. RFID technology consists of a tag, reader, and database. A radio frequency reader scans the tag for data and sends the information to a database. This will allow for hazardous waste import/export data collection and the tracking of harmful chemicals which threaten the environment, our health, and economic security if these shipments cross the borders unchecked and untracked.

Objectives

The objective of this verification project is to demonstrate the use of RFID technology to track chemicals and hazardous wastes in transit. There are physical characteristics of chemical wastes and waste containers that may interfere with the radio frequency signal. The test will determine if the RFID reader can gather, process, and transmit information about the location of the tagged hazardous waste as it moves from one site to another.

Study Description

Advancements are being made in RFID technology and application. Independent analysis of these various RFID tracking scenarios will be performed. Passive, semipassive, and active tags may be analyzed during this project. Laboratory and field testing will be completed to identify the optimum conditions for success. RFID tag location, antenna orientation, read distance and optimum radio frequency will be examined. The frequency determines the speed of communication as well as the distance from which the tag can be read. The higher the frequency, the further the read range.

Status

The stakeholder process is ongoing, and the project is seeking RFID vendors.

Next Steps

EPA is seeking interested RFID vendors to participate in a program to test a unique use of RFID for shipping certain goods/materials from generator to receiver. This program is being carried out under EPA's Environmental and Sustainable Technology Evaluation (ESTE)/Environmental Technology Verification (ETV) Program. This is a partial cost-sharing program, and it is targeted to high-risk Agency needs. The program will have high visibility. EPA will initiate and directly manage verifications of up to 10 potential vendors. The shipping scenario would include checkpoints along the way, including across North American borders. Tag data should be capable of capture in an information-management system. Read range should be 5-10 feet, with 100 percent read capability through metal, liquid, solids, and viscous materials. Tags should be resistant to environmental factors, including heat, humidity, impact, vibration, acids, dirt, and radiation. System security is vital. The RFID tracking will be designed to complement a future e-manifest system as discussed in the Federal Register, March 4, 2005, Part III, EPA, 40 CFR Parts 260, 261, et al., Hazardous Waste Management System: Modification of the Hazardous Waste Manifest System; Final Rule. Questions may be submitted to bearden.janet@epa.gov and accompanying answers will be provided to all who have responded.

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